

WHAT IS CLAIMED IS:

[C1] An object detector comprising:

an antenna irradiating an electric wave to a detection region and receiving its echo;

control means for switching a beam width and /or a beam direction of the antenna and scanning a plurality of detection regions such that one detection region overlaps at least any one of other detection regions;

detecting means for detecting whether a detection object exists in the detection region or not based on the received echo; and

bearing specifying means for narrowing down a bearing in which the detection object exists based on detection results of the plural detection regions.

[C2] The object detector according to claim 1, wherein the bearing specifying means narrows down the bearing in which the detection object exists based on both detection results of the detection regions where the object was detected, and the detection results of the detection regions in which the object was not detected.

[C3] The object detector according to claim 2, wherein the bearing specifying means specifies a region provided by excluding a region corresponding to sum of sets of the detection

regions where the object was not detected, from a region corresponding to product set of the detection regions where the object was detected, as a bearing in which the object exists.

[C4] The object detector according to claim 3, wherein the bearing specifying means treats information whether the detection object exists in the detection region or not with a logical value, and calculates the region provided by excluding the region corresponding to the sum of sets of the detection regions where the object was not detected, from the region corresponding to the product set of the detection regions where the object was detected, using logical operations.

[C5] The object detector according to any one of claims 1, wherein the bearing specifying means specifies the bearing in which the object exists, after detection results are obtained referring to the predetermined plural detection regions.

[C6] The object detector according to any one of claims 1, wherein the control means repeats scanning for a set of detection regions by which the whole regions corresponding to the sum of sets of all detection regions can be scanned, with the least number of scanning, among the predetermined plural detection regions; and when the object was detected in either one of the set of the detection regions, it starts scanning

for the other detection regions required for narrowing down the bearing in which the object exists.

[C7] The object detector according to any one of claims 1, comprising setting means which can set one or more bearings of bearings which can be specified by the bearing specifying means, as a bearing to be detected, wherein the control means scans only the detection regions required for narrowing down the bearing to be detected, which was set by the setting means, among the predetermined plural detection regions.

[C8] The object detector according to any one of claims 1, wherein the antenna is a phased array antenna comprising a plurality of antenna elements and phase shifters; and the control means switches a beam width by varying the number of antenna elements to be fed, or switching a beam direction by controlling a feeding phase of the phase shifter.

[C9] The object detector according to claim 8, comprising an amplifier provided every antenna element and varying a feeding power to the antenna element depending on the number of the antenna elements to be fed.

[C10] The object detector according to claim 8, comprising a power distributor for distributing a power to the

plural antenna elements; and

an amplifier varying a power to be supplied to the power distributor depending on the number of antenna elements to be fed.

[C11] An object detecting method of detecting an object with an antenna irradiating an electric wave to a detection region and receiving its echo comprising:

a step of switching a beam width and/or a beam direction of the antenna and scanning a plurality of detection regions such that one of detection regions overlaps at least any one of them;

a step of detecting whether a detection object exists in the detection region or not based on the received echo; and

a step of narrowing down a bearing in which the detection object exists based on detection results of the plural detection regions.

[C12] The object detecting method according to claim 11, comprising a step of narrowing down a bearing in which the detection object exists based on both detection results of the detection regions where the object was detected, and the detection results of the detection regions in which the object was not detected.

[C13] The object detecting method according to claim 12, comprising a step of specifying a region provided by excluding a region corresponding to sum of sets of the detection regions where the object was not detected, from a region corresponding to product set of the detection regions where the object was detected, as a bearing in which the detection object exists.

[C14] The object detecting method according to claim 13, comprising a step of treating information whether the detection object exists in the detection region or not with a logical value, and calculates the region provided by excluding the region corresponding to the sum of sets of the detection region where the object was not detected, from the region corresponding to the product set of the detection regions where the object was detected, using logical operations.

[C15] The object detecting method according to any one of claims 11, comprising a step of specifying the bearing in which the object exists, after detection results are obtained referring to the predetermined plural detection regions.

[C16] The object detecting method according to any one of claims 11, comprising a step of repeating scanning for a set of detection regions by which the whole regions corresponding

to the sum of sets of all detection regions can be scanned with the least number of scanning, among the predetermined plural detection regions; and when the object was detected in either one of the set of the detection regions, starting scanning for the other detection regions required for narrowing down the bearing in which the object exists.

[C17] The object detecting method according to any one of claims 11, comprising a step of scanning only the detection regions required for narrowing down the bearing to be detected, among the predetermined plural detection regions, in a case where one or more bearings are set as the bearing to be detected among the specifiable bearings.